

## ASD Weekly Highlights for the Week Ending 25-Mar-2006

### Operations Report for August 21-27

#### Beam Activity

Recorded Activity Type	Hours	Percent of Total
Beam Time (delivered to Target)	1.5	1.0
Beam Time to Extraction Dump	5.0	3.5
Beam Time to Injection Dump	8.6	6.0
Beam Time to Linac Dump	37.1	25.8
Machine Startup (from a Planned Shutdown)	6.9	4.8
Machine Studies (R&D)	8.3	5.8
Planned Shutdown (no Beam, no Testing)	58.0	40.3
Testing (Machine on, no Beam, e.g. RF Processing)	18.5	12.9
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Total Activity Recorded	143.9	
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Total Beam Time	52.2	68.4
Total Downtime Recorded	24.1	31.6

#### Downtime by Category

Category	SubCategory	Hours	Notes
Cooling Systems	DI	0.5	Bad flow meter for MEBT Quads
Cooling Systems	DI	0.1	MEBT Quads 1-4 trips due to water flow
Cooling Systems	DI	2	Not enough flow for SCL mod 15
Cooling Systems	RFQ Chiller	0.5	RFQ 3 Wall Bottom Flow meter tripping below 2 GPM
Cooling Systems	RFQ Chiller	1	RFQ 3 Wall Bottom tripping
Diagnostics	LS - Laser Stripper	1	Repair LDRD photodiode signal
Electrical Systems	HVCM - High Voltage	3.3	RFQ modulator replaced probes

Electrical Systems	HVCM - High Voltage Converter Modulator	0.1	SCL modulator 21 trip on Modulator over current
Electrical Systems	HVCM -	2.5	Water leak at SCL mod 21
RF Systems	HPRF-MEBT	0.8	MEBT PA 4 208 Volt brk and DP breaker tripped
Machine Protection System	Fast Protect - Latched	0.5	LEBT Chopper Scope not working preventing to go to higher than Inj dump mode
RF Systems	Cavities and Structures	10	
RF Systems	HPRF	1	Ion pump replaced
RF Systems	LLRF	0.5	SRF 21b-d and 22a-c tripped
RF Systems		0.2	Two trips due to Admin Power limit violation
Vacuum	Vacuum Pumps and Controllers	0.1	Ion pump between CM 8 and CM 9 tripped off

## Accelerator Physics

- The accelerator physics group had a large presence at the LINAC 2006 conference held in Knoxville, including two invited oral presentations and 10 contributed posters.
- The SNS linac was retuned from an energy of 840 MeV to 890 MeV to facilitate an experiment on laser stripping of H<sup>-</sup> to H<sup>+</sup>.
- Weekly progress report for HEBT, Ring, and RTBT systems, for week ending 25/Aug/06
- On Aug. 17 we increased the beam power on the target to a record 5.3E13 protons per pulse, on a pulse-on-demand basis. Approximately 804 minipulses were accumulated in the ring to test our ability to paint a full distribution on the target. (Full power 1.4 MW operations calls for 1.5E14 ppp and 1000 minipulse accumulation.) The tilt of the beam at the target was reduced to about 2.9 degrees, but the peak density of the beam on the target was about 37% higher than nominal. This also provided a good test of the ring RF system, which worked very well. Only one of the three first-harmonic RF systems was required to control the beam.
- Work on the H<sup>-</sup> and H<sup>0</sup> beam trajectories to the injection beam dump continues. We have not been able to determine magnet settings that simultaneously meet all the constraints. However, some improvements have been made that will allow us to run at higher beam intensities.

## RF Systems

### Ring

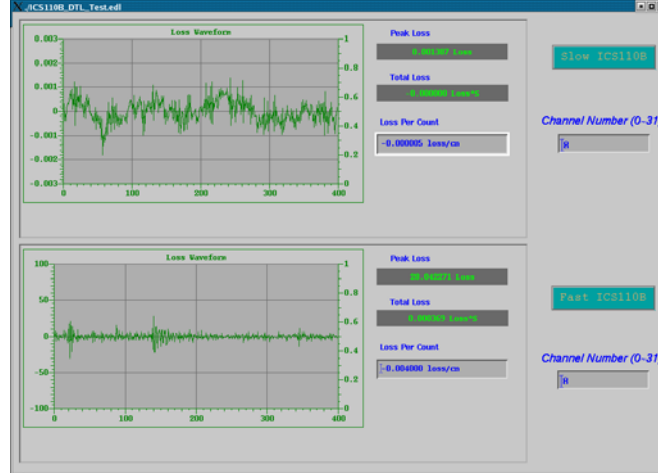
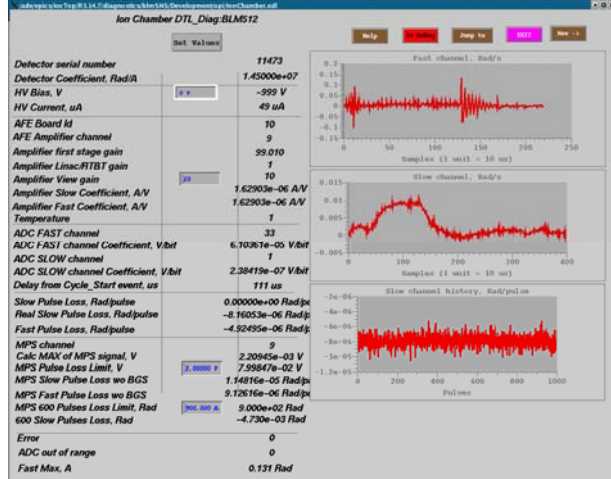
- We ran one station, RF13, with new parameter settings and 10 dB of attenuation removed from the signal input to the driver stage of the power amplifier chain. The system performed well with 820 usec long high intensity ( $5.3 \times 10^{13}$  protons per pulse) beam pulses. No additional tuning was required and the control range available from the Low Level RF System was only 20 percent of the range available. This is encouraging since, with these parameter settings, the Low Level RF system would have enough control range to handle full design intensity  $1.6 \times 10^{14}$  proton per pulse beams.
- Over the past few weeks we have demonstrated the use of Dynamic Cavity Tuning to compensate for beam loading but did not need to use this additional correction scheme to control the system at intensities of  $5.3 \times 10^{13}$  protons per pulse.
- We continue to study beam loading control options and plan to insert the parameter settings demonstrated with station RF13 on the remaining fundamental component stations.

## Ion Source

- A new cesium collar connected to an external elemental cesium reservoir has delivered 60 mA averaged over the 1.21 ms long pulses at 10 Hz. The emittance remains to be determined.
- An overview on “The Development of High-Current, High-Duty-Factor H-injectors” has been presented orally at LINAC’06.
- Four posters describing the latest ion source designs and developments for the power upgrade have been presented at LINAC’06.
- Today Richard Scrivens from CERN visited us to compare notes and have discussion on various ion source techniques, problems, and issues.

## Instrumentation and Controls

- Several members of the Controls Group spent time at the LINAC ’06 Conference held in downtown Knoxville this week.



- New BLM software was tested in the DTL BLM IOC. The main improvements are better DMA support, higher priority tasks for the calculations in the ICS110 ADC driver, and waveform subtraction from beam off triggers for background subtraction. Tests were performed at 10, 30, and 60 Hz. With a limited number of CA clients, the IOC load peaked at 30% while triggering at 60 Hz. In order for the background subtraction to be effective the trigger rate has to be the same as the RF near the BLM. The picture on the left shows the present loss screen for DTL\_Diag:BLM512 where there is ~0.01 Rads peak due to x-rays in DTL 5. The picture on the right shows the slow and fast waveforms from the new software. The slow waveform was approximately scaled using the raw data and shows the signal after background subtraction which is a factor of 10 lower than the existing software. The fast data was not scaled.
- Analogue comparator boards to be used for a preliminary Chopper MPS System (“CHoMPS”) are assembled and ready for characterization. An MPS output and gate timing board design is underway
- Several small HPRF tasks were accomplished during this week’s maintenance day. These had been awaiting permission from the SRF Task Force for several weeks. A 3-second delay was added in the HPRF shutdown after the RF Kill command. The HPRF IOCs were rebooted to change the fault log text to “Water Leak”. The HPRF HB Power Limit soft IOC was split into 2 soft IOCs to fix the problem where the limit change screen would get stuck. (The sequences didn’t progress past their “init” state.) The Cryo alarm soft IOCs were rebooted to update their access control lists to include the new OPI server. The utility module temperature alarms for Ring HPRF IOC1 were updated.
- At the same time, long-scheduled improvements were made to the Linac LLRF system. Initial turn-on using the new and safer systems encountered no difficulties. An EPICS database and screen that allow access to some daughter board registers were added for the ring llrf development system.
- All documentation for the insulating vacuum for the first 16 cryo modules is complete and handed over to the Electrical Group. A special connector required for the turbo pumps is hard to find and has a long lead time i.e. 10 to 12 weeks. Lead time for a possible alternative connector is 2 weeks. An appropriate cable is still being sought. PLC software remains to be written.
- Installation continues on RTFT Test Cave controls. All communications cables have been pulled and termination is in progress. Documentation for the RTFT

vacuum test cave PLC rack is complete and rack stuffing will start next week. Controller cable parts are here and ready to assemble. PLC coding has begun. Meanwhile progress continues on the Personnel Protection Systems for the RF Test Cave. PLC programming is 75% complete, field cabling is 90% complete and the control panel assembly has been installed in the test facility.

- Troubleshooting of “DeviceNet” problems in the Ring area was carried out during the maintenance day on Monday. Results were mixed: The RID air handler fan will now run in “auto”. However problems remain with the Ring PS DI water pumps, which must still be run manually. Troubleshooting will continue during the September maintenance period.
- Work continued on Control System Studio (CSS) design for plots, application data exchange and archive data access.
- This week the Diagnostics Team installed the laser in the tunnel for LDRD experiment. Cable modifications for Ring FBLMs were made; a new Neutron detector was installed at CM12; as was a new video camera in the Laser Wire 12 pick-off box.
- The PELCO cameras are working and mounted on the PED manipulator in the Target Building high bay. Controls for the hoist on the PED manipulator are not working, and are being debugged. Additional conduit for six CAT5e cables is being installed from HUR PLC cabinet to the TGT\_ISC:CAB on the fourth floor. One of these cables will be for the CCTV in the HUR and the others will be spares.

## **SRF Facility**

**No Report**

## **SRF Task Force**

**No Report**

## **Survey and Alignment**

**No Report**

## **Cryo Systems**

**No Report**

## **Mechanical Systems**

**No Report**

## **Electrical Systems**

**No Report**